

electro-analytical separation of metals with the apparatus described in the *Journal of the Chemical Society*. A somewhat similar apparatus was briefly described by Dr. F. M. Perkin.

Interesting results obtained with transparent silver and other thin metallic films were shown by Prof. T. Turner. Thin gold leaf becomes transparent when heated to about 550°; the change does not depend on the nature of the atmosphere. Thin silver leaf requires the presence of air or oxygen for a similar change. Thin sheet copper, heated to 200°, becomes transparent, and transmits yellow-green light quite freely.

A discussion on the practical utilisation of peat was opened by a paper from Dr. Woltereck, dealing with the production of ammonia from atmospheric nitrogen by means of peat. Experiments have shown that a mixture of nitrogen and hydrogen passed over reduced iron at a low heat produces ammonia, and that the presence of oxygen and water was of importance. Finally, the hydrogen was omitted and peat substituted for the iron with satisfactory results. It is claimed that atmospheric nitrogen cooperates in the formation of ammonia. Subsequent speakers included Prof. Ryan, Prof. Turner, Sir James Dewar, and Mr. K. B. Eller, but the discussion failed to bring out any new facts of importance.

The aromatic nitroamine committee (secretary, Dr. K. J. P. Orton) reported on the transformation of nitro-amino-benzenes into nitro-anilines. The influence of the solvent, nature of the acid catalyst, and the effect of concentration of the acid and temperature have been studied.

The report of the committee for the study of hydro-aromatic substances (secretary, Prof. A. W. Crossley) contained the usual valuable summary of recent work in this field, together with new investigations on dimethyldihydrobenzene.

GEOLOGY AT THE BRITISH ASSOCIATION.

THE geologists who were privileged to attend the meetings of Section C at Dublin will always recall with pleasure the kindly welcome and helpful assistance extended to them by the home geologists. Not only did they give us a president whose brilliant address promises to be historic, and arrange for our benefit a delightful series of excursions in the neighbourhood of Dublin, but they communicated many papers of great interest, and took a very active part in the work of the section.

Prof. Cole's lecture on the geology of the country round Dublin, which followed the president's address, summarised the principal points of interest in the district, and led us to a clearer view of the many important features we were enabled to see in the afternoon excursions organised and led by Mr. H. J. Seymour and others.

Prof. Cole also contributed two other papers, one dealing with the examination of the stones brought up during the dredging expeditions of the Fisheries Branch of the Department of Agriculture and Technical Instruction for Ireland. The discovery, off the coast of Kerry, of abundant flints, chalk, glauconitic chalk, and Milioline limestone showed that the Cretaceous and Eocene seas extended to an unknown distance towards the west.

The other paper was explanatory of an exhibit of the types of rock formed during the intervals between the basaltic eruptions in the north of Ireland in Eocene times. It was urged that the red lateritic zone represents basalt altered *in situ*, and is clearly connected with the climatic conditions of Eocene times. The pale bauxites are considered to be derived from sporadic eruptions of rhyolite, and a thin bauxite layer overlying the pisolitic iron-ore may in part be formed by wind-borne material.

Messrs. R. J. Ussher, H. J. Seymour, E. T. Newton, and R. F. Scharff gave the results of their joint work in the exploration of the Cave of Castlepook, near Doneraile. Both the geological evidence and the characteristics of the fauna collected lead towards the conclusion that the cave is pre-Glacial in age, and support the opinion that

Ireland has not been joined to England by land in Glacial or post-Glacial times.

Messrs. H. B. Muff and R. Carruthers described the structure of the Leenane district, co. Galway, and Prof. S. H. Reynolds and Mr. C. I. Gardiner dealt with rocks along the same strike in the Tourmakeady district, co. Mayo.

The veteran geologist Mr. G. H. Kinahan, although prevented from attending the meeting through illness, sent a paper on the raised beaches of the Liffey Valley, and Mr. H. Bolton reported the details of a boring in the Lower Coal-measures at the Emerald Pit, Dunganon.

The igneous rocks of the seldom visited outer Blasket Islands were described by the president.

Besides the above papers dealing with Irish geology, a fine collection of photographs of geological interest, and a typical set of Irish rocks, were exhibited by Mr. R. Welch and other local workers.

Desert phenomena, which have played so important a part in the proceedings of the section for some years past, were again discussed in several important papers. Dr. W. F. Hume contributed notes on the petrography of Egypt, Mr. G. W. Grabham dealt with the well-water supply of the north-east Sudan, Dr. A. Hutchinson gave the results of a chemical and physical examination of some remarkable crystals of dolomite obtained from Algeria, while fossil deserts were referred to in the report of the Trias Committee. With the view of obtaining further data regarding the conditions under which the Triassic rocks of Britain were laid down, a new research committee was appointed to conduct investigations in the marginal parts of the Sahara about Biskra, in Algeria, and Mr. J. Lomas will shortly proceed to Africa to make observations bearing on the point.

In glacial geology two papers were presented. Dr. Derryhouse, in reading the report of the Erratic Blocks Committee, showed that there is still much useful work to be done, despite the long time the committee has been at work. Prof. W. M. Davis, of Harvard University, in dealing with the glacial erosion in north Wales, confined his remarks to the Snowdonian district. He demonstrated that in Tertiary time the mountains existed as a group of monadnocks surmounting a peneplain which extended far into mid-Wales. During the Glacial epoch the intervening valleys were deepened, and cwms were formed which showed that glacial erosion in certain valleys amounted to 400, 600, or 800 feet.

In mineralogy and petrography eight important papers were read. The president, in the course of an examination of the Deccan basalt, found them to contain native iron and gold. Dr. A. Hutchinson described a new method of drawing stereographic projections of crystals, and exhibited a protractor designed for the use of students of crystallography. Dr. H. A. Bemrose showed and described a number of slides illustrating the microstructure of Derbyshire limestones, and Mr. H. Brodric contributed a note on the structure and occurrence of cave pearls. Dr. Tempest Anderson's paper on the changes in the Soufrière of St. Vincent was a continuation of the work done by Dr. Flett and himself on the remarkable volcanic eruptions which occurred in the West Indies a few years ago.

Dr. J. Milne, in discoursing on the duration and direction of large earthquakes, showed that while small earthquakes have a duration of a few seconds near their origin, and at a distance of fifty to 100 miles they may not be recordable, large earthquakes suffer no appreciable decay during transmission, and their duration appears to increase rather than decrease. Another observation in connection with recent seismological observations is that large earthquakes travel farthest in particular directions.

Other papers on earth movements were contributed by Prof. W. H. Hobbs and Dr. Woolacott. The former dealt with the recent earth movements within the basin of the Laurentian lakes, and by methods of precise levelling he was able to demonstrate that the recent tilting of the province proceeded at variable rates at different points.

Dr. Woolacott, in describing a case of thrust and crush

brecciation in the magnesian limestone of Durham, showed that the beds have been thrust against a horst, the flexible beds have been deformed without being much broken, while the harder, brittle limestone has been highly brecciated. He estimates that the amount of lateral displacement has been about 100 yards, and by experimental tests he indicates the magnitude of the thrust to have been about 300 tons per square foot.

The president, in opening a discussion on mountain building, referred to recent investigations on mountain structure, which revealed the fact that in the overlap of recumbent folds the uppermost folds were of greater span than those beneath, and this could not be explained on the notion that horsts of the accepted type were responsible for the features observed. He calculated that at the depth at which the horsts were supposed to exist the rocks would be in a viscous condition owing to radio-active heating and incapable of transmitting a direct thrust. With rigid rocks overlying a viscous mass he showed that compressive forces would cause the rocks to bulge upwards, and lying folds would be produced. Sir Archibald Geikie described the two-fold types of mountains, one possessing the Alpine structure and the other taking the form of plateaux upraised without disturbance except at their margins. He could not accept the explanation offered by Suess for the latter type, that the sea had fallen. He reminded the audience that folding was not all of one age, and the forces which have produced the Alps in the past may be acting at the present day.

Prof. Lapworth, in describing the principal mountain ranges on the earth's surface, urged that in their distribution they follow the curves of harmonic motion. Those existing beneath the ocean or as festoons of islands fall in with the general scheme as illustrated by the law of curves. All the islands of the world and all the mountains are strung on a great circle which corresponds with the line dividing the land and water hemispheres. The northern and eastern hemispheres are above the node of the great curve, while the southern and western hemispheres are below the node. On the great master folds there are smaller corrugations bearing the same relations as the harmonics to the fundamental in a vibrating cord. In this way the central depressions of continents can be correlated with the submerged ridges in the ocean depths.

Prof. Sollas, in referring to the theory put forward by the president, showed that piled-up folds would blanket the deep-seated rocks, and a highly heated region beneath mountain folds might account for the lower value of gravity observed in the neighbourhood of mountain chains. The approximation of remote areas brought about by folding involved the transference of viscous material from one region to another. This would not only result in bulging up, but in the lateral traverse of material. The thrusting which built up the Alps and the Carpathians was felt in the British Islands, and the cracks produced in the splintered crust of Scotland and the north of England might have afforded a passage for the underlying lava, which perhaps originated under the Alps. Given the deformational figure of the earth, the position of mountain chains follows from it, since on Prof. Joly's theory they will arise where sedimentation has taken place, *i.e.* at the limit of land and water.

Prof. Cole suggested that the older opinion of Scrope regarding uplift and sliding was receiving confirmation in later days, and the festoon arrangement of islands and mountain chains was the result of the frontal movements of sliding masses.

Paleontology was represented in the section by papers dealing mainly with the fossil Reptilia. Prof. H. G. Seeley described a fossil reptile from the Upper Karroo of Cape Colony which possessed a proboscis or trunk, and in a second paper the dentitions of the Cynodontia and Gomphodontia were contrasted.

The occurrence of reptilian footprints in the Inferior Oolite of Whitby was announced by Mr. H. Brodrick, and in the Trias report Mr. H. C. Beasley described the tracks of invertebrates found in association with footprints in the Triassic rocks.

Mr. W. Whitaker, in describing a deep boring recently made on the Thames marshes at Cliffe, reported a fact

which has an important bearing on the character of the floor of older rocks underlying the Secondary rocks of Kent. At 1030 feet below Ordnance Datum Silurian rocks were penetrated. The practical bearing of the boring is that it puts a northern limit to the Kent coalfield.

PHYSIOLOGY AT THE BRITISH ASSOCIATION.

THE large number of individual papers presented this year made it necessary to hold afternoon sessions each day of the meeting, and even then it was difficult to find room for all the papers. Apart from the president's address, which has been published already (October 1, p. 553), the various communications are described herein, but owing to lack of space some of the papers, which cannot be conveniently summarised, are noted only by title.

After the presidential address, Prof. Sherrington, F.R.S., read a paper on proprioceptive reflexes of the limb. In a decerebrate animal the two hind legs are prepared so that all the muscles, except the extensor of each knee, are paralysed. Thus there is left on each side an afferent and an efferent nerve supply from a single muscle. The limbs are supported so that the knee can be extended by muscular contraction and flexed by gravity. Flexion at the right knee causes extension of the left leg, whilst extension on the right causes flexion on the left; that is, stretching the extensors causes a reflex contraction of the crossed extensors, and relaxation of the extensors produces reflex inhibition of the crossed extensors. The tone of the muscle depends on reflex impulses from itself, and when the extensor is passively stretched it does not return to its original length, but, being inhibited, remains more flexed than it had been; conversely, relaxation of the extensors leaves the limb in a more extended position. The final report of the committee on the "metabolic balance sheet" of the individual tissues was presented by Prof. Gotch, F.R.S. The object of the committee, namely, the development of sound and fruitful methods for investigating the metabolism of individual tissues, having been accomplished, it did not desire re-appointment. The report reviews the work that has been done by the committee during the past five years. The technique of various experimental procedures has been improved upon, and these improvements are dealt with as follows:—gas analysis, anaesthetics, prevention of clotting, measurement of rate of flow, and analysis of gases of perfusion fluids. The organs employed and a comparison of the results obtained are stated, and the report concludes with a list of the papers so far published as a result of the work of the committee. Sir Lauder Brunton, F.R.S., whilst presenting the report of the committee on the effect of climate on health and disease, read a paper on influenza, showing that epidemics of influenza are accompanied by an increased death-rate from pulmonary diseases, and he compared these outbreaks with various meteorological data. Dr. Grabham then gave a paper on the physics of high altitudes in relation to climate and health. From various measurements of humidity, wind pressure, and electrical potential he suggests that deficient electrical charge in the atmosphere is one of the conditions in a relaxing climate.

In the afternoon Prof. Swale Vincent presented the report of the committee on ductless glands. The view that the thyroid and parathyroids are intimately related is supported, and evidence is furnished that the suprarenal gland constantly pours its secretion into the blood stream, and thus regulates the blood pressure. Prof. Macallum, F.R.S., read two papers. In the first he recorded the analysis of urine in polyuria produced by the ingestion of large quantities of water. The total solids were so reduced that freezing-point determinations showed a very much reduced lowering. The percentage of chlorides decreased from the onset of polyuria, whilst that of potassium did not diminish until later on; thus at first the potassium showed a marked rise relatively to the sodium; at the same time, he could not find any appreciable dilution of the blood. These experiments are contrary to the view that urine is merely filtered from the blood, but they suggest that there is a selective action of the epithelial cells. His second paper dealt with the distribution of